

Having described the invention, the following is claimed:

1. A vaporizer for vaporizing a fluid to form an antimicrobial vapor, comprising:

a source of electromagnetic radiation; and

a heating apparatus for producing heat to vaporize an antimicrobial fluid passing therethrough, including:

(a) an electrically non-conductive material, and

(b) an electromagnetically responsive material.

2. A vaporizer as defined by claim 1, wherein said electrically non-conductive material is selected from the group consisting of: a polymer, a ceramic and a glass.

3. A vaporizer as defined by claim 2, wherein said polymer is selected from the group consisting of: a thermoplastic polymer and a thermosetting polymer.

4. A vaporizer as defined by claim 3, wherein said thermoplastic polymer is selected from the group consisting of:

a nylon; Amodel<sup>®</sup> (PPI, polyphthalamide); Aurum<sup>®</sup> (polyimide); Ryton<sup>®</sup>/Fortron<sup>®</sup> (PPS, polyphenylenesulphide); Fluoropolymers (PFA, FEP, Tefzel<sup>®</sup> ETFE, Halar<sup>®</sup> ECTFE, Kynar<sup>®</sup> PVDF); Teflon<sup>®</sup> PTFE; Stanyl<sup>®</sup> (4.6 polyamide, 4.6 Nylon); Torlon<sup>®</sup> (polyamide-imide); Ultem<sup>®</sup> (polyetherimide, PEI); and Victrex<sup>®</sup> PEEK (polyaryletherketone, polyetheretherketone).

5. A vaporizer as defined by claim 3, wherein said thermosetting polymer is selected from the group consisting of: an epoxy and a urethane.

6. A vaporizer a defined by claim 2, wherein said ceramic is a metal-oxide material.

7. A vaporizer as defined by claim 6, wherein said ceramic is selected from the group consisting of: silica, alumina, and magnesia.

8. A vaporizer as defined in claim 1, wherein said electromagnetically responsive material is selected from the group consisting of: a metal, a metal alloy, a metal coated material, carbon, graphite, stainless steel, a metal alloy solder, a ferromagnetic material, a ferrimagnetic material, a ferroelectric material, a ferrielectric material, and combinations thereof.

9. A vaporizer as defined in claim 8, wherein said metal is selected from the group consisting of: nickel, copper, zinc, silver, stainless steel, tungsten, nichrome, and combinations thereof.

10. A vaporizer as defined in claim 1, wherein said electromagnetically responsive material is a ferromagnetic material.

11. A vaporizer as defined in claim 1, wherein said electromagnetically responsive material is a ferrimagnetic material.

12. A vaporizer as defined in claim 1, wherein said electromagnetically responsive material is a ferroelectric material.

13. A vaporizer as defined in claim 1, wherein said electrically non-conductive material forms an electrically non-conductive matrix, said electromagnetically responsive material is embedded within the electrically non-conductive matrix.

14. A vaporizer as defined by claim 13, wherein said electromagnetically responsive material is in the form of a particulate selected from the group consisting of: fibers, flakes, spheres, whiskers, grains, a coated particulate and combinations thereof.

15. A vaporizer as defined in claim 1, wherein said electromagnetically responsive material forms a layer on a surface of said electrically non-conductive material.

16. A vaporizer as defined in claim 15, wherein electromagnetically responsive material is embedded in said electrically non-conductive material.

17. A vaporizer as defined in claim 15, wherein said electromagnetically responsive material is deposited on said electrically non-conductive material by at least one of: thermal spraying, electrodeposition, autocatalytic deposition, and arc spraying.

18. A vaporizer as defined in claim 1, wherein said electrically non-conductive material forms a layer to provide a protective coating, said protective coating isolating said electromagnetically responsive material from an antimicrobial fluid.

19. A vaporizer as defined in claim 18, wherein said electromagnetically responsive material is embedded in an electrically non-conductive material.

20. A vaporizer as defined in claim 18, wherein said electromagnetically responsive material is deposited to form said layer by at least one of: thermal spraying, electrodeposition, autocatalytic deposition, and arc spraying.

21. A vaporizer as defined in claim 1, wherein said source of electromagnetic radiation is a microwave generator, said microwave generator generating microwaves that cause heating of said electromagnetically responsive material.

22. A vaporizer as defined in claim 21, wherein said electromagnetically responsive material is selected from the group consisting of: a ferromagnetic material, a ferrimagnetic material, a ferroelectric material and a ferrielectric material.

23. A vaporizer as defined in claim 1, wherein said source of electromagnetic radiation produces an alternating current.

24. A vaporizer as defined in claim 23, wherein said alternating current has at least a first frequency and a second frequency, wherein said electromagnetic radiation penetrates said heating apparatus at respective first and second depths.

25. A vaporizer according to claim 1, wherein said heating apparatus includes:

a generally cylindrical tube, and

a screw-shaped insert dimensioned to be received within said generally cylindrical tube, said screw-shaped insert including a spiral passageway,

wherein at least one of said generally cylindrical tube and said screw-shaped insert are comprised of said electrically non-conductive material and said electromagnetically responsive material.